

AMENDMENT AND RESPONSE

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Serial No.: 09/432,022

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Attorney Docket No. 100.116US01

Title: SYSTEMS AND METHODS FOR HOLDOVER CIRCUITS IN PHASE LOCKED LOOPS

CLAIMS

- Sub. (Previously Presented) A phase locked loop circuit, comprising:
- a differential phase detector that receives an input signal and a feedback signal and produces a differential output signal;
 - an electronic selector circuit having
 - at least one first input coupled to the differential output signal of the phase detector; and
 - a second input that is responsive to a detected state of the input signal;
 - a loop filter circuit having an operational amplifier, the operational amplifier having at least one amplifier input, wherein the electronic selector circuit provides the differential output signal of the phase detector to the amplifier input;
 - a voltage controlled oscillator coupled to an output of the operational amplifier and providing an output frequency for the phased locked loop circuit; and
 - wherein the electronic selector circuit is operable to control the amplifier input to hold the output frequency of the voltage controlled oscillator at a substantially constant frequency when the input signal to the phase detector is interrupted.
2. (Previously Presented) The circuit of claim 1, wherein the electronic selector circuit decouples the amplifier input from the differential output and holds the output frequency under an external command when the input signal to the phase detector is interrupted.
3. (Original) The circuit of claim 2, wherein the electronic selector circuit holds a current signal input to the operational amplifier when a reference signal to the phase detector is interrupted.
4. (Previously Presented) The circuit of claim 3, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit holds a current signal input to the operational amplifier by coupling the pair of amplifier inputs at the same potential.

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5. (Previously Presented) The circuit of claim 4, wherein the electronic selector circuit includes a switch which couples the pair of amplifier inputs together when the reference signal to the phase detector is interrupted.

6. (Previously Presented) The circuit of claim 2, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit includes a logic-based selector circuit which holds the pair of amplifier inputs to an identical potential level when the input signal to the phase detector is interrupted.

7. (Previously Presented) The circuit of claim 2, wherein the electronic selector circuit re-couples the amplifier input to the differential output of the phase detector when the input signal is restored.

8. (Previously Presented) A phase locked loop circuit, comprising:

- a differential phase detector that receives an input signal and a feedback signal and produces a differential output signal;
- an electronic selector circuit having:
 - at least one first input coupled to the differential output signal of the phase detector; and
 - a second input that is responsive to a detected state of the input signal;
- a loop filter circuit having an operational amplifier, the operational amplifier having at least one amplifier input, wherein the electronic selector circuit provides the differential output signal of the phase detector to the amplifier input;
- a voltage controlled oscillator coupled to an output of the operational amplifier and providing an output frequency for the phased locked loop circuit; and
- wherein the electronic selector circuit de-couples the amplifier input from the differential output and holds the output frequency of the voltage controlled oscillator to a last received signal from the differential output when the input signal to the phase detector is interrupted.

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9. (Previously Presented) The circuit of claim 8, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit includes a switch which couples the pair of amplifier inputs together to hold the last received signal as a current signal input to the operational amplifier when the input signal is interrupted.

10. (Previously Presented) The circuit of claim 8, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit includes a logic-based selector circuit which holds the pair of amplifier inputs to an identical potential level to hold the last received signal from the differential output at the operational amplifier when the input signal to the phase detector is interrupted.

11. (Previously Presented) The circuit of claim 10, wherein the logic based selector circuit includes a pair of AND gates, each AND gate having an output coupled to one of the pair of amplifier inputs, wherein one input of each AND gate is coupled to the differential output, and wherein the other input of each AND gate is coupled to an external command signal source.

12. (Original) The circuit of claim 11, wherein the external command signal source provides a high potential to one input of each AND gate.

13. (Previously Presented) The circuit of claim 8, wherein the electronic selector circuit recouples the amplifier input to the differential output of the phase detector when the input signal to the phase detector is restored.

14. (Original) The circuit of claim 8, wherein the output frequency of the voltage controlled oscillator provides the feedback signal to the differential phase detector.

15. (Previously Presented) A communication system, comprising:
a number of traffic cards having traffic inputs and traffic outputs;
a switching device coupled to the number of traffic cards; and

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a synchronization source, coupled to the number of traffic cards, having a selector coupled to an external synchronization source and a controller, wherein the selector provides an input signal to a phased locked loop circuit, wherein the phase locked loop circuit is coupled to the controller, and wherein the phase locked loop circuit includes:

a differential phase detector that receives the input signal and a feedback signal and produces a differential output signal;

an electronic selector circuit having:

at least one first input coupled to the differential output signal of the phase detector; and

a second input that is responsive to a detected state of the input signal;

a loop filter circuit having an operational amplifier, the operational amplifier having at least one amplifier input, wherein the electronic selector circuit provides the differential output signal of the phase detector to the amplifier input;

a voltage controlled oscillator coupled to an output of the operational amplifier and providing an output frequency for the phased locked loop circuit; and

wherein the electronic selector circuit de-couples the amplifier input from the differential output and holds the output frequency of the voltage controlled oscillator to a last received signal from the differential output when the input signal to the phase detector is interrupted.

16. (Previously Presented) The system of claim 15, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit includes a switch which couples the pair of amplifier inputs together to hold the last received signal as a current signal input to the operational amplifier under an instruction from the controller when the input signal is interrupted.

17. (Previously Presented) The system of claim 15, wherein the amplifier input includes a pair of amplifier inputs and wherein the electronic selector circuit includes a logic-based selector circuit which holds the pair of amplifier inputs to an identical potential level, under an instruction

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from the controller, to hold the last received signal from the differential output at the operational amplifier when the input signal to the phase detector is interrupted.

18. (Previously Presented) The system of claim 17, wherein the logic based selector circuit includes a pair of AND gates, each AND gate having an output coupled to one of the pair of amplifier inputs, wherein one input of each AND gate is coupled to the differential output, and wherein the other input of each AND gate is coupled to an external command signal from the controller.

19. (Original) The system of claim 18, wherein the external command signal includes a high potential signal provided to one input of each AND gate.

20. (Previously Presented) The system of claim 15, wherein the electronic selector circuit recouples the amplifier input to the differential output of the phase detector when the input signal is restored.

21. (Original) The system of claim 15, wherein the output frequency of the voltage controlled oscillator provides the feedback signal for the differential phase detector.

22. (Original) The system of claim 15, wherein the output frequency of the voltage-controlled oscillator further serves as a system clock to a number of system modules connected to the communication system.

23. (Previously Presented) A method for preventing data errors in a communication system, comprising:

coupling input data to a phase locked loop circuit, wherein the phase locked loop includes:

a differential phase detector that receives an input signal and a feedback signal and produces a differential output signal;

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an electronic selector circuit having:

at least one first input coupled to the differential output signal of the phase detector; and

a second input that is responsive to a detected state of the input signal;

a loop filter circuit having an operational amplifier, the operational amplifier having at least one amplifier input, wherein the electronic selector circuit provides the differential output signal of the phase detector to the amplifier input; and

a voltage controlled oscillator coupled to an output of the operational amplifier and providing an output frequency for the phased locked loop circuit; using the electronic selector circuit to control the amplifier input to hold the output frequency of the voltage controlled oscillator at a substantially constant frequency when the input signal to the phase detector is interrupted; and

using the electronic selector circuit to release control of the amplifier input to follow the differential output when the input signal to the phase detector is restored.

24. (Previously Presented) The method of claim 23, wherein the amplifier input includes a pair of amplifier inputs and wherein using the electronic selector circuit to hold the output frequency of the voltage controlled oscillator at a substantially constant frequency includes using the electronic selector circuit to de-couple the pair of amplifier inputs from the differential output and hold the output frequency of the voltage controlled oscillator to a last received signal from the differential output when the input signal to the phase detector is interrupted.

25. (Currently Amended) The method of claim 24, wherein using the electronic selector circuit to de-couple the pair of amplifier inputs from the differential output includes using a switch to couple the pair of amplifier inputs input together to hold the last received signal as a current signal input to the operational amplifier when the input signal is interrupted.

26. (Previously Presented) The method of claim 24, wherein using the electronic selector circuit to de-couple the pair of amplifier inputs from the differential output includes using a

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logic-based selector circuit to hold the pair of amplifier inputs to an identical potential level in order to hold the last received signal from the differential output at the operational amplifier when the input signal to the phase detector is interrupted.

27. (Previously Presented) The method of claim 26, wherein using a logic-based selector circuit to hold the pair of amplifier inputs to an identical potential level includes using a logic-based selector circuit having a pair of AND gates, coupling an output of each AND gate to one of the pair of amplifier inputs, coupling one input of each AND gate to the differential output, and coupling the other input of each AND gate to an external command signal source.

28. (Currently Amended) The method of claim 27 28, wherein using a logic-based selector having a pair of AND gates and coupling the other input of each AND gate to an external command signal source includes coupling the other input of each AND gate to a high potential.

29. (Previously Presented) The method of claim 23, wherein the amplifier input includes a pair of amplifier inputs and wherein using the electronic selector circuit to release control of the amplifier input to follow the differential output includes using the electronic selector circuit to re-couple the pair of amplifier inputs to the differential output of the phase detector when the input signal is restored.

30. (Original) The method of claim 23, wherein the method further includes using the output frequency of the voltage controlled oscillator for providing the feedback signal to the differential phase detector.

31. (Original) The method of claim 23, wherein the method further includes using the output frequency of the voltage controlled oscillator as an output frequency for a system clock coupled to a number of system modules connected to the communication system.